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## CO<sub>2</sub> CAPTURE USING NANOPOROUS TiO(OH)<sub>2</sub>/TETRAETHYLENEMINE

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In this work, an inorganic-organic CO<sub>2</sub> sorbent was prepared by immobilizing tetraethylenepentamine (TEPA) onto nanoporous titanium oxyhydrate (TiO(OH)<sub>2</sub>). The prepared sorbents were characterized using X-ray diffraction, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), thermogravimetric analysis (TGA), and Brunauer-Emmett-Teller (BET) analysis. At the optimal TEPA loading of 60 wt.% on TiO(OH)<sub>2</sub>, its CO<sub>2</sub> sorption capacity reached 3.1 mmol CO<sub>2</sub>/g-sorbent for 1 vol.% CO<sub>2</sub> in N<sub>2</sub> along with ~1 vol.% H<sub>2</sub>O at 60°C. Studies of adsorption kinetics and thermodynamics showed that the activation energies for CO<sub>2</sub> adsorption and desorption of TiO(OH)<sub>2</sub>/TEPA are 38.31 kJ/mol and 44.51 kJ/mol, respectively. Its low CO<sub>2</sub> desorption activation energy means a high CO<sub>2</sub> desorption rate and thus a low CO<sub>2</sub> capture cost. The sorbent has the potential to be used for capturing ultra-dilute CO<sub>2</sub> from gas mixtures.

Key words: CO<sub>2</sub> capture; nanoporous titanium oxyhydrate; sorption; kinetics

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